DRISI

Caltrans Division of Research, Innovation and System Information

Research Results

Designing an Automated Safety Warning System Controller

A standardized automated controller for processing roadside data provides motorists timely and reliable notifications about traffic and weather conditions

Rural

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Project Title:
Automated Safety Warning System Controller

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Product Category: New equipment

Task Manager:
Sean Campbell
Senior Transportation Electrical Engineer, Specialist
sean.campbell@dot.ca.gov

WHAT WAS THE NEED?

California has many different warning systems on the state's highways to disseminate safety notifications, such as changeable message signs, Highway Advisory Radio, and flashing beacons. These warning systems depend on data collected from sensors and other detection systems. The data is then interpreted in a Transportation Management Center (TMC) or maintenance shop, and staffers make decisions about whether to issue a warning. This dependency on human interaction can slow the timely activation of a warning. Because rural TMCs are usually not staffed 24 hours a day, activating warnings or information systems can be further delayed. In addition, during severe weather, communication lines to a remote site might not be reliable, affecting the decision-making process to issue roadway warnings.

The implementations of the various warning systems are not standardized. Each system uses a controller that is customized to a particular physical and electrical layout. The lack of standardization of controllers poses implementation, maintenance, and communication challenges, especially when the warning systems are located in remote locations.

WHAT WAS OUR GOAL?

The goal was to develop a standardized Automated Safety Warning System Controller (ASWSC) that can collect and analyze roadside sensor data and issue related warning messages and signals.

A changeable message sign activated by the ASWSC

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DRISI provides solutions and knowledge that improve California's transportation system.

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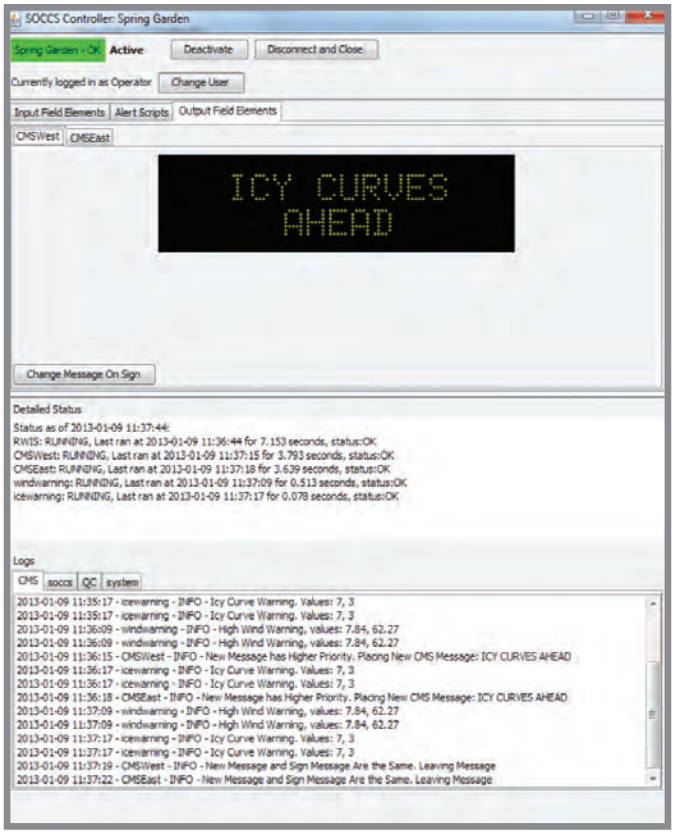
WHAT DID WE DO?

Caltrans, in partnership with the Western Transportation Institute at Montana State University, Bozeman, designed an ASWSC using commercial, off-the-shelf, Linux-based hardware and open source software. After extensive laboratory testing, a prototype was deployed in Caltrans District 2 on Highway 70 at the Spring Garden site near Quincy, which is prone to icy conditions. The researchers used the system to collect data from the surface sensors on that section of the road and alert drivers of ice.

The controller can be remotely managed and includes programming and scripting capabilities for implementing best practice algorithms for condition analysis and actuating corresponding warning signals and messages. The algorithm developed can be configured to meet the needs of a specific site based on geometrics and the microclimate of the surrounding area.



Operator's interface to the ASWSC

WHAT WAS THE OUTCOME?

The ASWSC's detailed time-stamped logging allowed the team to compare the data with other systems and confirm that the ASWSC was performing as expected. System performance information will be used for future enhancements and modifications. The final research phase, scheduled for 2014, will incorporate Caltrans Traffic Accident Surveillance and Analysis System (TASAS) data to determine if incidents were reduced by implementing this system.

WHAT IS THE BENEFIT?

The ASWSC monitors road and weather conditions and updates the warning systems accordingly without constant human intervention, improving traveler safety with more timely and relevant warning messages. The controller can interface with a variety of field sensors, elements, and safety warning systems, which streamlines operations and is more cost-effective than maintaining a multitude of disparate implementations. Using off-the-shelf equipment and open source software makes the ASWSC an economical solution. The ability to remotely access the controller reduces service costs. TMC operators and field engineers can adjust decision thresholds in response to changing weather, road, and incident conditions to further improve traveler safety.

LEARN MORE

For more information and updates about the ASWSC system, visit
http://westernstates.org/Projects/Controller/Default.html

Map of Spring Garden ASWSC equipment